

XI. *Scent-organs in the genus Hydroptila* (Trichoptera).

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PLATES XVIII AND XIX.

SCENT-ORGANS in the Trichoptera have so far attracted but little attention, and there are few references to them in the writings of entomologists.

Packard in his "Textbook of Entomology," p. 198, refers to the presence of scent-scales on the wing of *Mystacides punctata*. Scales, or thickened hairs, are found abundantly in the male sex on the maxillary palpi and in certain areas of the wings in some genera of the Sericostomatidae, notably *Lepidostoma*, *Silo*, and *Goëra*, and they are also to be found on the wings of certain species of *Setodes*, *Berœa*, *Glossosoma* and others.

In *Sericostoma* the inner surfaces of the maxillary palpi of the ♂ are densely clothed with masses of yellowish hairs or "fluff." It is suggested that these hairs form part of a system for the distribution of scent. A full description of the palpi is given by Bruce F. Cummings in the Proceedings of the Zoological Society of London, 1914, pp. 459-474, and reference made to them by W. Müller, "Archiv. f. Naturgesch." 1887, pp. 95-97. I have failed to find further references to scent-organs in the Trichoptera.

In *Hydroptila* the patterns of scent-organ are varied. In some species there are two eversible, tubular filaments, clothed with golden yellow or else black scent-hairs (Pl. XVIII, figs. 5 and 6; Pl. XIX, fig. 9); in another species there are four, without any hairs at all (Pl. XVIII, figs. 1, 2, and 3). The tubular filaments are probably everted by the action of fluid pressure. In some species scent-scales are present; in others, they have not as yet been made out. The scent-organ may consist of a membrane at the back of the lobes, which form so distinctive a feature of the genus. The membrane is capable of considerable dilatation and carries a few battledore scent-scales on

its surface (Pl. XVIII, fig. 4, and Pl. XIX, figs. 7 and 8). Accompanying this form of scent-organ are to be found two tufts of scent-hairs, similar in character to those clothing the eversible, tubular filament in the other pattern. The tufts originate in blunt, membranous projections, apparently not eversible, situated towards the inner bases of the lobes, and developing out of a membrane which, in all species examined, stretches across the back of the head between the lobes.

Whether all these varying characters should rightly be described as scent-organs, *i. e.* distributors of scent, is a speculation into which the writer is not prepared to enter, but it appears just a little curious that in one comparatively small order such as the Trichoptera so many diverse patterns of scent-organ should be found, varying even in the same genus according to the species, and all supposed to fulfil the same function.

In this memoir it is proposed to give a brief description of the scent-organs of some of the species of *Hydroptila*, and it will be seen that the organs furnish reliable characters by which the closely resembling species of the *sparsa* form may be separated. In all species so far examined the head is furnished with two lobes varying in size and shape, in some species bivalvular. These lobes are erectile, are sometimes lined with scent-scales (Pl. XIX, fig. 10), and the scent-organs are all situated beneath them, or on their inner surfaces. When a tubular filament is withdrawn it is turned outside in, like the finger of a glove, *i. e.* the apex is returned within the walls of the filament, so that when partly withdrawn or everted there is formed a re-entering cup at the extremity (Pl. XVIII, fig. 2). When a filament clothed with hairs is partially extended or retracted, the hairs are gathered together and protrude from the hollowed extremity in a dense yellow or black brush, according to the species (Pl. XVIII, fig. 5, and Pl. XIX, figs. 9, 10, and 11).

In *H. femoralis* this brush in its normal position rests in contact with the scent-scales lining the lobe, and no doubt, on being everted, distributes the scent collected on the hairs to the surrounding atmosphere. Possibly this arrangement may be found to exist in other species as well.

The scent-organs occur in the male sex only.

*Description of Scent-organs.***Hydroptila sparsa** Curt. (Pl. XVIII, figs. 1, 2, and 3).

The scent-organ consists of four eversible, tubular filaments arising from a membrane extending across the back of the head, between the lobes. Although an examination has been made of a large number of individuals, I have as yet found no clear trace of scent-hairs. Two small groups of battledore scales are attached to the membrane towards the bases of the filaments. These scales differ in shape from those of the other species, having greatly elongated foot-stalks.

The lobes appear to be merely bi-valvular caps, covering the membrane when the filaments are withdrawn.

**Hydroptila simulans** Mosely (Pl. XVIII, figs. 5 and 6).

There are two eversible, tubular filaments clothed with golden-yellow hairs. I have not been able to satisfy myself as to the presence or absence of scales on the inner surfaces of the lobes, which have somewhat the appearance of longitudinally bisected acorns with roughened inner surfaces.

**Hydroptila forcipata** Eaton (Pl. XIX, figs. 7 and 8).

The lobes are very narrow, and each is lined with a membrane capable of considerable dilatation. There is a ring of rather narrow striated battledore scales towards the junction of this membrane with the margin of the lobe. A membrane extends across the back of the head connecting the two lobes. Towards the base of each lobe there is a slight swelling in this membrane, from which arises a bunch of scent-hairs, but there does not appear to be any eversible filament.

**Hydroptila maelachlani** Klap (Pl. XVIII, fig. 4).

In this species the scent-organ seems similar in construction to that of *H. forcipata*. The scales on the membrane may perhaps be fewer in number, and the scent-hairs are inserted in funnel-shaped sockets. The lobes are even more narrow than in *H. forcipata*, and when in their normal position are pressed flat against the back of the head, inclining towards each other and nearly invisible without the aid of a powerful lens.

**Hydroptila femoralis** Eaton (Pl. XIX, figs. 9 and 10).

The scent-organ consists of two eversible, tubular filaments clothed with black hairs; there are battledore scales very plentifully lining the cup-shaped lobes (Pl. XIX, fig. 10). When the filaments are retracted the hairs are collected together in a dense brush with their extremities resting against the scales of the lobes. The ends of the hairs are slightly broadened, and probably, as mentioned above, collect the scent matter and distribute it to the surrounding atmosphere when the filament is exerted.

**H. pulchricornis** Pict.

I have seen only two examples of this species, and they are both mounted in positions which do not permit of a high-power examination of the scent-organs. There are two eversible, tubular filaments clothed with black hairs as in *H. femoralis*, but I have been unable to ascertain whether there are any scent-scales present.

**Hydroptila occulta** Eaton (Pl. XIX, figs. 11 and 12).

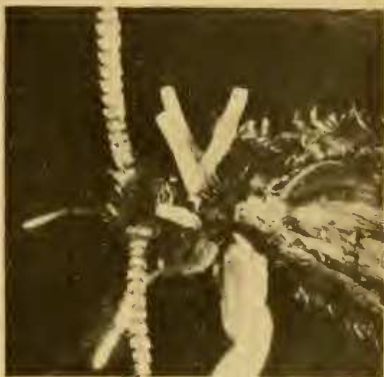
In *Hydroptila occulta* the scent-organ is rather complex. There are two eversible, tubular filaments clothed with golden-yellow hairs. The lobes, which are rather narrow and blunt, are each lined with a membrane, and, towards the apex, this membrane can be slightly everted to form a secondary tubular filament. Towards its extremity this filament is clothed with elongated striated scales, but hairs, similar to those on the main filaments, are absent.

Another cluster of these scales is found towards the base of the lobe, and a row of them occurs along the membrane which extends across the back of the head. At the apex of each lobe there is, in addition, a small group of striated battledore scales similar in shape to those of *H. femoralis* (Pl. XIX, fig. 12).

There are, in addition, two described British species of *Hydroptila*—*tigurina* Ris., and *sylvestris* Morton—which I have never seen. There are also two undescribed British forms in my own collection which unfortunately do not display scent-organs sufficiently clearly for description here. One species certainly possesses a brush form of tubular filament, but a full description must be deferred until more material comes to hand.



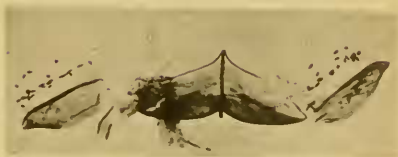
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M. E. Mosely, photo.

SCENT-ORGANS IN *HYDROPTILA*